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hen a child loses a baby tooth, it is normally placed under his or her pillow, waiting for the Tooth Fairy to come and collect it and leave behind a little toy or some money in exchange for the tooth. But will children of the future be using those lost teeth for something different, such as growing new teeth or even saving lives? Researchers believe that stem cells found in dental pulp—one of the layers inside the tooth—may hold the potential to do just that. While the full possibilities of tooth-derived stem cells are as yet to be determined, some researchers think that these cells could one day be valuable for regenerating dental and other tissues.

Stem cells are unspecialized cells that have the potential to differentiate into other types of cells with more specialized functions, such as muscle cells, blood cells, or brain cells, which can be used to repair tissues and organs. Stem cell research has been a controversial topic in the last few years, but that controversy surrounds embryonic stem cells, which are harvested from embryos, not the somatic (or adult) stem cells that are generally harvested from bone marrow and umbilical cord blood and have been determined to exist in dental pulp. Since

the late 1960s, bone marrow transplants have been used to help cure cancerous diseases that interfere with the production of red blood cells, white blood cells, and platelets, such as leukemia, Hodgkin's and non-Hodgkin's lymphoma, and leukemia, and they may also prove effective with certain lung and ovarian cancers. According to the National Institutes of Health (NIH), stem cells offer the possibility of a renewable source of replacement cells and tissues to treat a variety of diseases, including Alzheimer's, Parkinson's, spinal cord injury, stroke, burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis.

But where do teeth come in? According to the NIH, stem cells from baby and wisdom teeth have the ability to make dentin and pulp, and they might even have the ability to make bone. Harvested from the pulp layer inside the teeth, as well as

jawbone and periodontal ligament, these stem cells may one day correct periodontal defects and cleft palate, one of the most common birth defects. The cells also have the potential to save injured teeth and grow jawbone, or maybe even regenerate an entire tooth.

The viability of stem cells derived from baby teeth is determined by when the tooth comes out, says the NIH. The longer a loose tooth is left in the mouth to fall out on its own, the less viable it is as a source of stem cells. To extract the stem cells from teeth, researchers can remove the periodontal ligament, drill into the tooth to remove the crown, and extract the

pulp, which is then placed in an enzyme solution to release the stem cells. Cells can be isolated from jawbone by collecting marrow following a tooth extraction or by biopsy.

Do all these exciting scientific findings mean you should start "banking" your child's baby teeth or your own wisdom teeth? Not so fast, say the American Dental Association (ADA) and the NIH. No one knows for certain what the full possibilities are for these dental stem cells, and since the field of dental stem cell research is just emerging,

it may be years before their uses are fully determined. Currently, there are no human trials taking place with postnatal cells and there are no clinical applications available, according to the ADA. But just as the "banking" of umbilical cord stem cells has been marketed to expectant parents, dental pulp stem cell tissue banks (including one located in Newton, Massachusetts) have begun to market to both dentists and consumers.

Despite its potential, the future of dental stem cell research is still unknown. Is the discovery of dental stem cells going to have a lasting impact on the dental and medical world, or is this just weird science? Only time will tell. In the meantime, it looks like the Tooth Fairy still has job security.

For more information on stem cells, visit http://stemcells.nih.gov/info.

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